



# **An Overview of Heavy-Duty Alternative Fuel Engines and Vehicles**

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U.S. Department of Energy  
Office of Transportation Technologies





# Information Sources

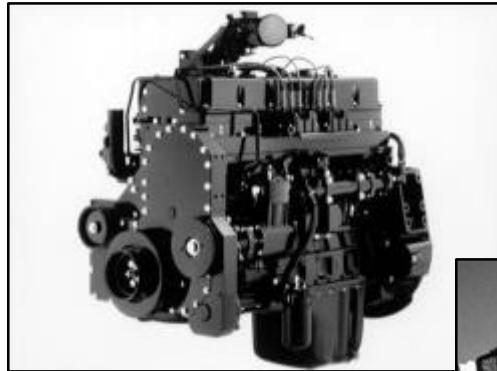
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- Manufacturers
- Alternative Fuel Data Center (AFDC)
- Gas Research Institute (GRI)
- American Public Transit Association (APTA)
- CALSTART

# Presentation Overview

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Engines



Vehicles

Buses

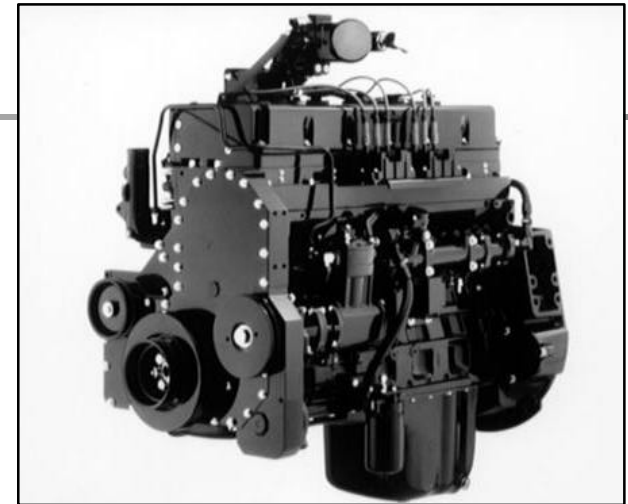


Trucks



# Alternative Fuel Engines

## Types of Alternative Fuel Heavy-Duty Engines

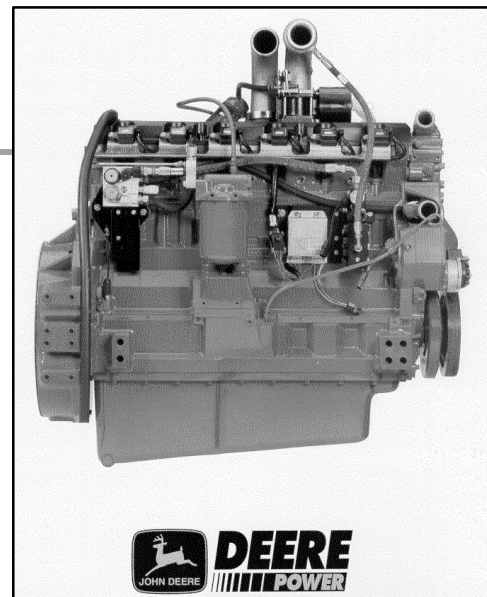


Cummins L10G

Fuel	Engine Type	Ignition Assist	Typical CR	Throttle?
Conventional Diesel	Compression Ignition	None	15 to 18:1	No
LNG, CNG and LPG	Spark Ignition	Spark Plug	10 to 11.5:1	Yes
LNG or CNG	Pilot Ignition	Diesel Fuel	16:1	No

# Alternative Fuel Engines

Spark Ignited  
Natural Gas Engines  
(CNG and LNG)



150-230	375-500	5.9 L	Cummins	B5.9G	CFFV LEV and ULEV	Optional 2.5 g/bhp-hr
225	640	6.8 L	John Deere	6068H	CFFV LEV and ULEV*	Optional 2.5 g/bhp-hr*
250-275	800	8.1 L	John Deere	6081H	CFFV LEV and ULEV*	Optional 2.5 g/bhp-hr*
250-275	660-750	8.3 L	Cummins	C8.3G	CFFV LEV and ULEV	Optional 2.5 g/bhp-hr
250-300	780-1040	8.5 L	Detroit Diesel	S50G	1998 EPA Bus	1998 CARB Bus
280-300	900	10 L	Cummins	L10G	CFFV LEV and ULEV	Optional 2.0 g/bhp-hr
325-350	1180-1260	12 L	Mack	E7G	CFFV ULEV	Optional 2.0 g/bhp-hr
330	1400	12.7 L	Detroit Diesel	S60G	1998 EPA Bus**	1998 CARB Bus**

\* Now available with EPA and CARB bus cert, EPA CFFV LEV Fall '98, ULEV and CA low NOx early 99

\*\* 3Q98 - Motor Coaches only

# Alternative Fuel Engines



Cummins B5.9G



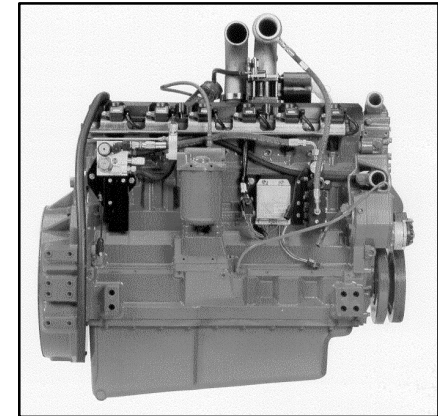
Cummins C8.3G



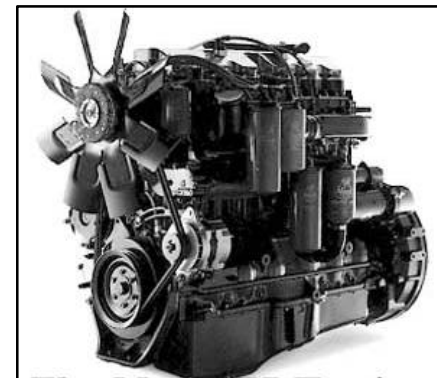
Cummins L10G



DDC S50G



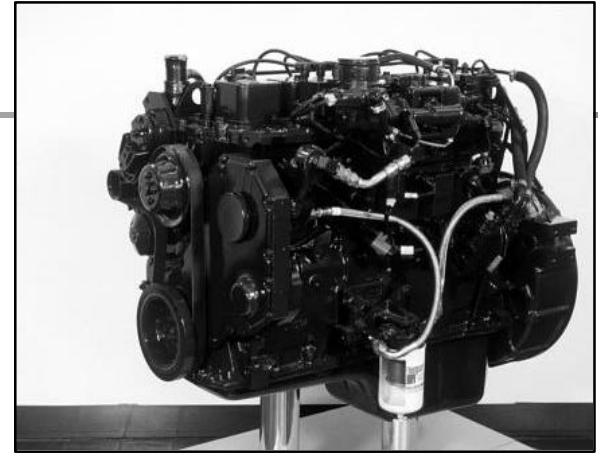
John Deere 6081H



Mack E7

# Alternative Fuel Engines

## Spark Ignited Propane Engine



Cummins B5.9 LPG

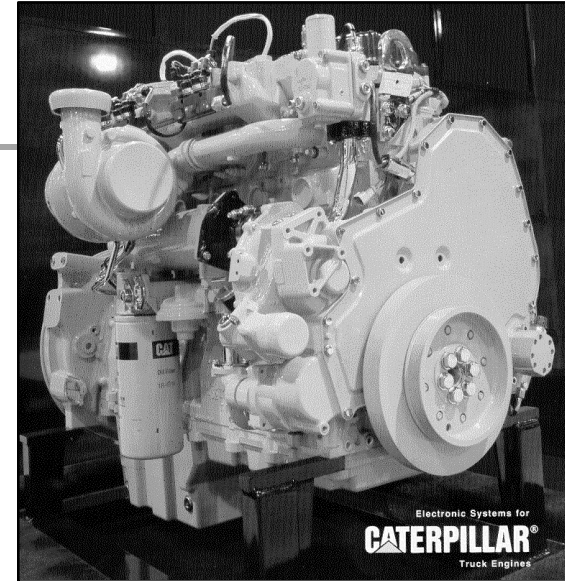
Cummins B5.9LPG is the only propane engine currently available made by a heavy engine manufacturer.

- 195 hp @2600 rpm
- 420 ft-lb torque @2800 rpm
- EPA CFFV LEV certified



# Alternative Fuel Engines

## Pilot Ignition Natural Gas Engines (CNG and LNG)



Horsepower	Torque (ft-lb)	Displacement	Manufacturer	Model	EPA Cert.	CARB Cert.
190-250	520-660	7.2 L	Caterpillar	3126	1998 EPA Truck**	Optional 2.5 g/bhp-hr
305	1050	10.3 L	Caterpillar	C10	1998 EPA Truck*	Optional 2.5 g/bhp-hr
410	1250	12 L	Caterpillar	C12	1998 EPA Truck**	Optional 2.5 g/bhp-hr

Propane versions of these engines are planned for the near future

# Alternative Fuel Buses

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- Background information from APTA  
(Mostly CNG)
- Manufacturers





## Background Information on CNG Buses

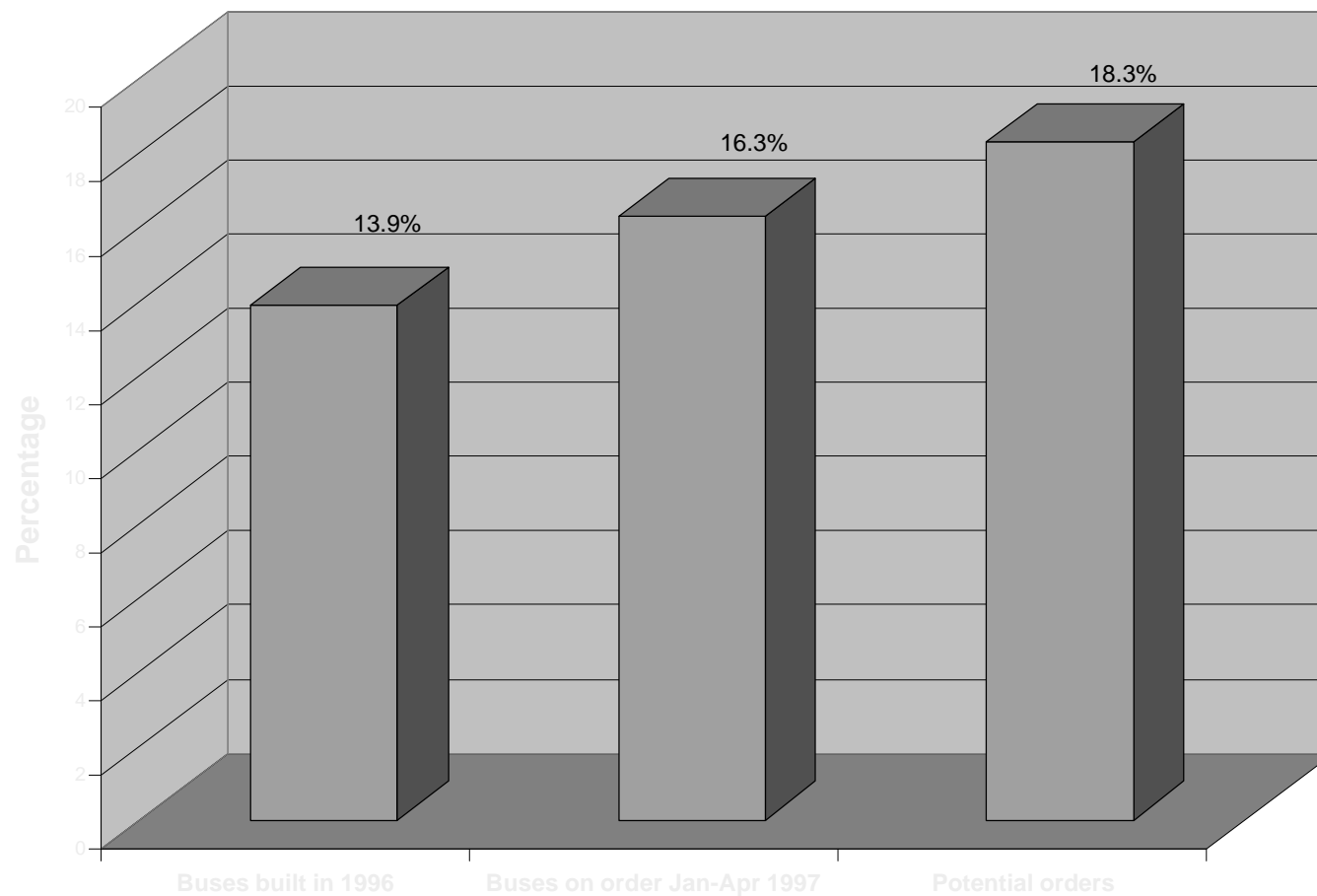
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Some data on CNG buses from APTA:

- 7 of the 10 largest transit fleets are using CNG buses
- 19 of the 35 largest transit fleets are using CNG buses
- 87 transit fleets were using CNG buses by March 1997
- 5.6% of all transit buses use alternative fuels (mostly CNG)

# Background Information on CNG Buses

## CNG Bus Market Penetration



# CNG Buses Available

Manufacturers offering full-size CNG buses include:

- Nova BUS
- New Flyer Industries
- North American Bus Industries (NABI)
- Orion
- NeoPlan
- ElDorado-National
- Thomas Built



New Flyer



# CNG Buses Available

Manufacturers offering CNG shuttle buses include:

- World Trans (Collins)
- Blue Bird
- Champion
- Chance Motor Coach
- El Dorado
- Goshen Coach
- Metotrans Corp
- New Flyer Industries
- North American Transit
- Omnitrans
- Orion



Blue Bird



El Dorado

# CNG Buses Available

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Manufacturers offering CNG school buses include:

Blue Bird



Thomas Built



# LNG Buses Available

Manufacturers offering LNG transit buses include:

- Gillig
- New Flyer Industries
- NeoPlan
- North American Bus Industries
- Nova BUS



Gillig



Nova BUS



North American Bus Industries



# Alternative Fuel Trucks





# Alternative Fuel Trucks

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Manufacturers offering alternative fuel trucks include:

- Crane Carrier
- Freightliner
- Kenworth
- Mack
- Peterbilt
- Volvo

# CNG and LNG Trucks - Crane Carrier

## Crane Carrier Refuse Hauler

- CNG or LNG
- Various engines available:
  - Cummins L10G, C8.3G, B5.9G
  - Detroit Diesel Corporation S50G



# CNG and LNG Trucks - Freightliner

## Freightliner LNG Trucks with

- Models FL50, FL60, FL70, FL80, FLD112
- Class 5-8
- CNG and LNG
- Cummins B5.9G engine and DDC S50G engines



# CNG and LPG Trucks - Freightliner Custom Chassis

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Freightliner Custom Chassis MT-45 Delivery Van  
with Cummins B5.9 engine.

Available in  
CNG or Propane  
Versions



# LNG Trucks - Kenworth

Kenworth T800 with Cummins L10-300G engine



- Class 8 - regional delivery truck
- 300 hp engine



# LNG Trucks - Mack

Mack MR and LE Refuse Haulers with Mack E7G engine



Class 8  
325 hp





# LNG Trucks - Peterbilt

Peterbilt 320 LNG truck with Cummins L10G engine

- Refuse and vocational applications
- Class 8, 300 hp





# CNG and LNG Trucks - Volvo

Volvo Xpeditor Refuse Truck with Cummins L10G engine

Class 8

300 hp





## Other Alternative Fuel Trucks

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### CNG Street Sweepers

- Athey
- Elgin
- Tymco
- Johnson

### Spotting Trucks

- Ottawa (CNG and LNG)
- SISU (CNG)

### CNG Step Van

- Spartan Motors

**For More Information. . .**

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**For More Information. . .**

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*To talk to a real person...*

*Alternative Fuels  
Hotline  
1-800-423-1DOE*



## Some Additional Web Resources. . .

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DOE's Clean Cities Website

<http://www.afdc.doe.gov>

American Public Transit Association (APTA)

<http://www.apta.com>

CALSTART

<http://www.calstart.org>

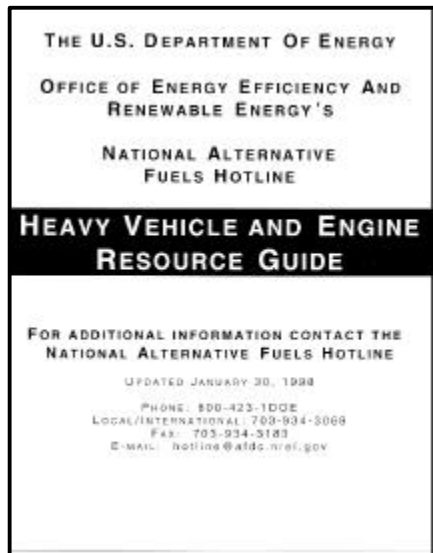
GRI's NGV Resource Center

<http://www.ngv.igt.org>

California Energy Commission (CEC) AFV Website

<http://www.energy.ca.gov/afvs/index.html>

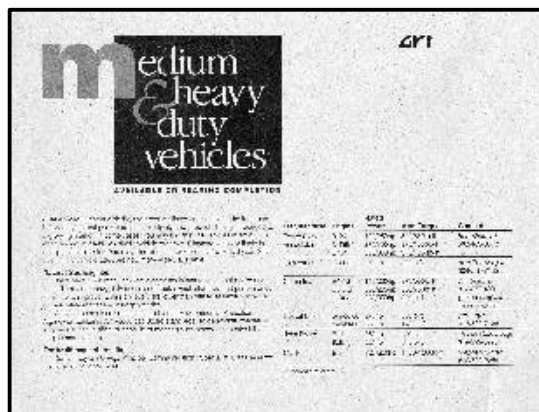
# Publications you should get . . .



## *DOE Heavy Vehicle and Engine Resource Guide*

Latest Update: January 1998

Available from the National Alternative Fuels Hotline and the Alternative Fuels Data Center Website



## *Medium and Heavy Duty Vehicles Available or Nearing Completion*

Latest Update: January 1998

Available from the Gas Research Institute and the National Alternative Fuels Hotline